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Social innovation in the shadow of policy failure: Energy efficiency in self-build housing

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ABSTRACT

The United Kingdom has been a slow adopter of energy efficiency measures in domestic buildings. Ambitions to ensure that new homes are built to 'zero carbon' standards have been expressed by policy makers but subsequent targets have been abandoned. In the UK housing sector, the high costs of land, the stagnating delivery of affordable new-built homes, and market dominance by a handful of high-volume housebuilders limit progress towards lower carbon newbuild homes. Against this backdrop, the paper seeks to examine the emergence of a supposedly 'alternative' sub-sector. Inspired by pioneering initiatives in countries like Germany and the Netherlands, a handful of self-build projects have emerged in the UK. Through the analysis of two in depth case studies, Bath street in Edinburgh and Graven Hill in Oxfordshire, we find that self-build projects can not only deliver more diverse and bespoke homes, but also more energy efficiency. Our analysis therefore unpicks their success stories vis-à-vis the inefficiencies of speculative house building where the adoption of national policies on zero carbon homes has been resisted. Framing the emergence of these self-build projects in the UK as social innovation, we identify the physical, conceptual and affective spaces for system change that are opened up by our case studies. We subsequently reflect on the key roles played by intermediaries, including local authorities, in the potential facilitation and mainstreaming of self-build approaches to delivering more energy efficient homes.

1. Introduction

Transitions in energy supply and demand have offered a rich focus for scholarship seeking to develop the concept of 'social innovation' [1,2]. With regards to domestic homes, the importance of adopting people-centred approaches to transforming the relationship between energy and the home, has been demonstrated [3]. In our contribution to this special issue, we apply this evolving conceptual framework to self-build housing, an emerging UK housing 'sub-sector', prominent and culturally embedded in many parts of the world but argued (including by national government) to be significantly under-developed in the UK. We explore how the pursuit of self-build housing projects as a socially innovative practice, can help overcome a well-recognised problem in the UK: the systemic failure to deliver more energy efficient homes, despite considerable technological advancement [4–6].

We refer herein to 'self-build' in a broad sense; existing literature is considerably fragmented not least by virtue of a multitude of different terms being invoked to describe the role of owners and tenants in the delivery of new housing. 'Self-build', 'Custom-build', 'Group-build', 'Collective Build' are just some of the signifiers used to capture the nuances of this approach [7]. In the UK, the Self-build and Custom Housebuilding Act 2015 [8]: '*does not distinguish between self-build and custom housebuilding and provides that both are where an individual, an association of individuals, or persons working with or for individuals or associations of individuals, build or complete houses to be occupied as homes by those individuals.*' One of the reasons these terms blur into one catch-all category in this context arguably stems from the overbearing dominance of 'speculative' housebuilding in the UK housing sector. Under this model new

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homes are designed and constructed to minimal regulation standards and without input from future homeowners. By controlling and limiting the local supply of new homes, the volume house builders succeed in selling these products profitably [9]. Given this relative inflexibility in mainstream housebuilding, we focus here on the opportunities for energy efficient homes to be derived from a more intimate relationship between home-owners and the delivery of new houses via a variety of different 'self-provided' routes [7,10].

The rate of self-build in the UK (8% of new homes) stands in significant contrast to many countries elsewhere in Europe, where rates can reach as high as 80% (Austria) [11]. The UK government has expressed commitment to narrow this gap. The 2015 Self-Build and Custom Housebuilding Act allows individuals and organisations to register their interest in self-build projects and stipulates that such registers should inform certain public authority planning considerations. Meanwhile, industry bodies such as the NaSCBA [11], and the academic literature [12–15], consistently champion the 'co-benefits' associated with an up-scaled self-build sector. As cited by a house of commons briefing paper [16], investment in expansion of the sector is rationalised upon:

> *"… improving consumer choice in the UK housebuilding sector, securing environmentally sustainable housing, building strong communities and cost effectively achieving a home that meets the needs and aspirations of individual households"*

Particularly interested in the notion that self-build is associated with more environmentally sustainable housing, the explicit aim of this paper is to explore *the extent to which self-build housing may provide a 'socially innovative' means of delivering energy efficient homes in the United Kingdom.*

The paper is structured as follows to address this aim. Section 2 conceptualises the attainment of more energy efficient housing in the UK via self-build as an exercise in social innovation, made possible through the facilitation of 'intermediary spaces' for homeowner engagement with a variety of more sustainable housebuilding possibilities. Section 3 presents our methodological approach to applying this to interpreting two empirical case studies of self-build collated by the lead author: Graven Hill in Bicester and Bath Street, in Portobello, a suburb of the city of Edinburgh. In both cases, new housing developments have delivered a number of energy efficient, low and zero carbon homes using a self-build approach loosely inspired by practices elsewhere in Europe but requiring significant adaptation and persistence by the stakeholders involved. Although of contrasting size, location and housing typology, our results section (Section 4) invokes a social innovation framing to illustrate what they *share:* the involvement of a new collection of individuals in the procurement, construction and delivery of their homes. Addressing the aim above, the discussion presented in section 5 reflects on the need for sufficient enablement of self-build projects by local authorities if the benefits are to be fully realised and the implications this has for the way housebuilding is currently governed in the United Kingdom. Finally, the concluding section (section 6) summarises the paper's contributions and reflects upon how self-build in the UK can have an impact far beyond the housing 'product' itself (better quality homes) through its role as a physical, conceptual and imaginary space for social innovation.

2. Conceptualising social innovation in UK housing

2.1. Embedded housing practices

Political discourse around housebuilding in the UK characterises a housing 'crisis' [17,18] that has served to disconnect the policy and political mandates governing the sector. Whilst policy has attempted to regulate the homes that are ultimately constructed and bring them in line with what has been proven as technologically feasible, the politics of housing has promoted the ideological aspiration to facilitate increasing rates of home ownership. Green and Lavery [19] describe how the UK's 'help to buy' policy served to "diffus[e] a broken model of housing access throughout the country" (p. 90), particularly to areas where it was politically expedient to garner votes. Critically, this implies that the demand for *more* new build homes (and the state's subsidisation of this demand) has served to squeeze out any serious engagement with the question of demand -and indeed the need- for *better* new build homes.

UK housebuilding is dominated by a select number of powerful corporations. The largest house builders (companies building more than 2000 homes per year) were responsible for the delivery of 63% of the UK's new houses in 2017, with the 'big 4' (Barratt, Persimmon, Taylor Wimpey and Bellway) responsible for more than half of these [20]. Over the same time period, the output from small house builders has dropped by 62% (ibid.). This growing oligopoly has led to increasing level of standardisation in the housing products on offer, with minimal adoption of sustainable technologies or progressive building specifications [9].

The UK government's Zero Carbon Homes (ZCH) policy, introduced under the Labour Party in 2006, set out to ensure the sustainability of future housing stock. The goal was to improve the practices of existing house-builders in terms of: (i) the sustainable qualities of the products they offer (interpreted as a 'fabric first' approach to efficiency); (ii) the infrastructure they connect to (low carbon heat and power); and (iii) their wider business strategy (allowable solutions, principally the ability to offset through involvement in emission reduction projects elsewhere) [21]. Perhaps the most eye-catching target of this policy was the promise of a fully zero carbon homes standard by 2016. The ZCH policy saw the large volume housebuilders as best placed to drive systemic transition in the industry. However the resistance of these very incumbents led to the policy's abandonment by the newly elected Conservative government in 2015, a year before it was due to come into force [4,6,22].

Writing in 2009 −6 years before the policy was ultimately abandoned− Osmani and O'Reilly [23] (p.1917) concluded that there were "numerous legislative, cultural, financial and technical barriers facing house builders to deliver zero carbon homes in England by 2016" and that overcoming these would require "a swift, all-embracing and above all realistic strategy is adopted and implemented across the supply chain". Despite the decade-long forewarning it had sought to give the industry, a lack of framework connecting the legislative and voluntary components of the proposed policy created significant barriers to its achievability [24,25]. The fact that it took the removal of the ZCH initiative to stimulate the voluntary market for 'Passivhaus' properties [26] should not be dismissed as mere irony, but reflected upon as evidence regarding the balance of power within the UK's housebuilding industry.[1]

Since the demise of the ZCH policy, two narratives have emerged from volume housebuilders regarding the ongoing challenge of lower carbon homes, and a reluctance to do anything other

[1] According to the Passivhaus institute, the definition of a passivhaus is "a building in which thermal comfort can be achieved solely by post-heating or post-cooling of the fresh air flow required for good indoor air quality without the need for additional recirculation of air." In the case of Potton they explicitly rationalise their passivhaus product as being in line with the government's abandoned standards.

than meet minimum building regulation requirements. Firstly, according to Payne et al [9] "difficult to resolve" issues associated with increased "risk" on the part of housebuilders, and secondly "no clear demand from customers for greater customization or energy efficient technologies" (p.6). Against such a backdrop of strong resistance to innovation on the part of volume housebuilders [27] it is arguably more important than ever to identify alternative new-build procurement approaches which are able to innovatively absorb perceived risks by engaging with a more nuanced (and less speculative) interpretation of consumer demand. Perhaps, more explicitly, we need approaches to new home procurement which move away from an 'and/or' assumption regarding demand for customization and demand for energy efficient technologies as two separate ambitions for the housing sector, and towards a narrative of customization *for* more sustainable lifestyles, including greater energy efficiency.

2.2. Self-build as social innovation

Over the years, various projects have illustrated the technical and financial feasibility of building affordable energy efficient homes in the UK, and each of these provides evidence to challenge the government's decision to revoke the ZCH policy [28]. Central to the rationalisation for our paper, however, is the argument that the challenges faced in delivering a zero-carbon home are too embedded, culturally and institutionally, as to be merely framed as succumbing to financial or technical barriers. Following Walker et al. [4,6]; we see these challenges as multi-faceted and systemic, intimately bound up in a housing system which reflects the political ideologies of fast-tracking homeownership levels and the powerful agendas of large housebuilders. An overtly technological, and technocratic, interpretation of what constitutes a zero-carbon home has prevented more critical engagement with the relationship between these systemic and persistent cultural problems with UK house-building and the sorts of (unsustainable) homes that are being delivered [29,30].

Against a speculative, highly politicised backdrop, the failure to deliver more sustainable, energy efficient homes, is hardly surprising. For example, the notion of 'allowable solutions', incorporated into the ZCH policy in order to allow housebuilders to offset any remaining emissions to meet zero-carbon status seems antithetical to the also incorporated 'fabric first' approach which would, presumably, allow 'later' sustainability efforts to be embraced by the owner. In this paper we argue there is a need to explore the potential benefits of 'inverting' this relationship. Rather than starting with the fabric first efficiency of a hypothetical new home and then allowing builders to 'achieve' zero-carbon status on a home by home basis through offsetting, what might be gained from seeing an actual, energy efficient, home as the *outcome* of the relationship between homes and their owner-builders [10,31]?

Academic literature on what has become most widely termed as 'self-build' is disparate but is captured most notably in the edited collection by Benson and Hamiduddin [10]. Contributions emphasise that despite relevance to both policy and research, self-build housing as a concept has "rarely appear[ed] in the pages of academic journals in these fields, its reputation as a niche being echoed in sparse accounts (p.1). Given the dominance of speculative housebuilding in the United Kingdom, self-build housing is somewhat portrayed as innovative by its very nature. As a result, rather than critically engaging with the innovative practices involved in making self-build work and how this opens up the potential for wider benefits to the housing system, there is a somewhat inevitable tendency to write off any past evidence of self-build as 'niche' and 'alternative' [15,32].

According to Parvin et al. [13], a self-build housing sector "less prone to speculation and volatility" is capable of "delivering high-quality, affordable, sustainable, homes"(p.9). While the authors go on to discuss how this is derived from self-build's privileging of the 'use value' derived by a particular occupant over the generic asset or exchange value sought by speculative housebuilders, their arguments are primarily theoretical and lacking empirical verification. As alternative housing *practices*, meanwhile, self-build is often framed in explicit resistance to (and even in antagonism with) the domineering mode of new home delivery in the United Kingdom [33]. Furthermore it is regularly portrayed via pre-existing exemplars of holistic self-built communities, often with 'eco'-driven rationales [12,14,34]. Notable UK projects of this type include LILAC in Leeds, where residents delivered a co-housing model funded by a community ownership scheme which puts certain restrictions on future onward sales [35], and Lancaster Co-Housing, where riverside land deemed unsuitable for the delivery model of volume house builders, was transformed into a collective housing project over a long timescale [12].

According to Caputo et al. [5], a discursive shift is now underway regarding self-build's status; from one of 'conflictual' stance towards centralised authority, to one of facilitative empowerment. Studies have thus begun to attend to the role of public policy in 'mainstreaming' self-build housing by facilitating projects that go beyond individual builds [36,37]. This includes considering what policy support might look like, how it could be delivered, and who would be responsible for delivering it [12]. However, to date little empirical work has sought to unpack self-build as an actively encouraged means of delivering new homes in the UK, perhaps inhibited by the lingering question of *how* such a mainstreaming can be envisaged within the existing dominant housing system. In the following section we draw upon the concept of social innovation to develop such a framework.

2.3. Social innovation 'intermediaries'

In establishing a framework for the paper's analysis to come, we follow Caroli et al. [38] in defining social innovation as "*a process (a new way of engaging players to solve specific needs) that emerges when the failure of conventional paradigms is evident*"(p.94). Here, we apply this to the delivery of more energy efficient homes in the shadow of the UK's failed zero-carbon homes policy and an increasing focus on its self-build sector and associated sustainability 'co-benefits'. However, in order to arrive at the delivery of more energy efficient homes through this new approach to housebuilding, it is crucial to understand what exactly this 'process' entails, vis-à-vis the dominance of the conventional paradigm, and how such processes are facilitated by actors simultaneously operating both within and outside the incumbent paradigm [39].

The existing literature on social innovation pays considerable attention to the role of 'mediators' [40] or 'middle actors' [41] who facilitate and drive change, through direct liaison with other agents. Drawing on theories of sustainability transitions [42,43] Kooij et al. [44] describe how "[a]n important role is played by intermediaries in connecting to [systemic] regime actors and in [the] upscaling and diffusion of the more mature models" developed within bounded niche exemplars (p.2). Warbroek et al. [2]similarly emphasise how intermediary agents are required to overcome resource and capacity-based hurdles which limit the ability of otherwise engaged citizens to drive systemic change in local energy initiatives. Middle actors, or intermediaries, have also been identified as being critical to facilitating social innovation within the housing sector, particularly with regards to retrofitting for energy efficiency [45–47].

Within a nationally politicised housing system, local authorities arguably act as key intermediaries at the interface of housing and

energy. They are the only actor necessarily committed to a particular location for the long term and whose relevant powers include spatial planning, environmental services, building standards, and energy efficiency. In the absence of formal mandates, local authorities in the UK work to create spheres of discretion for local innovation around domestic energy - often in response to fuel poverty [48]. Other intermediaries that play a crucial role in the actor ecologies that work to facilitate building retrofit for lower carbon, include architects and social and community enterprises [49,50]. The importance of 'trust' in the mediating agent has been identified as crucial for functioning in this role [51]. Middle actors can be understood as the primary agents of social innovation, creating low threshold opportunities for homeowners and tenants (as potential secondary agents of innovation) to become actively involved in decisions about the design and improvement of their homes and neighbourhoods.

Across the UK, interest in self build appears to be on the rise, evidenced by a growing number of projects and the positive attentions these receive. These projects require local councils to do things differently and devise innovative ways of intervening in local land and housing supply chains while working alongside other local actors such as SME housebuilders, architects and landowners. Together, these relationships and collaborations operate within what van Veelen [52], drawing on the work of geographer and theorist of space Doreen Massey, conceptualises as the 'intermediary spaces' of socio-technical transitions which work to shift the practices of the status quo. Examples of such projects therefore offer a powerful opportunity to examine what it might take for self-build -and more importantly the benefits it is purported to bring- to be upscaled in the context of the United Kingdom. In the reaminder of this paper we explore the intermediary spaces opened up by two contrasting types of self-build housing project in the UK with view to understanding their role in facilitating the delivery of more energy efficient homes.

3. Methodology

The use of social innovation as a conceptual framing for our engagement with self-build housing case studies serves two purposes. Firstly, it helps shed light on the innovative practices at work in delivering such projects vis-à-vis the respective "norms" of the prevailing new build housing system. Secondly, it allows specific attention to be paid to how these innovations combine to ultimately engender the delivery of more energy efficient homes (amongst other benefits). Together, these work to illuminate the ways in which self-build housing can help overcome the recognised challenges of delivering energy efficient homes in the UK's new build housing sector. With regards to the question of *how* to use social innovation as a conceptual framing, our analysis is informed in particular by Hoppe and de Vries [53] who posit that (I) new market models, (II) new actor configurations and (III) new institutional settings "create room for social innovation" in otherwise stagnant social systems (p.6). The Results section to follow therefore presents the qualitative thematic analysis we undertook to inductively organise our empirical data within these three themes. In the subsequent Discussion section we reflect on this analysis and the extent to which it has helped to address the aim of this paper.

3.1. The case studies

Graven Hill, located on the outskirts of Bicester, Oxfordshire, is a master-planned new town, currently undergoing construction on the site of a former military base. The project gained national media attention through its featuring on the UK television programme 'Grand Designs' which follows the endeavors of self-builders. The project is ongoing and incorporates a variety of different 'self-build' modalities into its overall vision. Meanwhile, and in many ways the polar opposite to Graven Hill, 'Bath Street', located in Portobello on the Eastern edge of the city of Edinburgh, is a development of four flats, constructed as a tenement building on a former urban brownfield site. Led by a local architect, the project has been recognised for its innovative procurement methodology, architectural dynamism and for the environmental quality of the end-product.

In both cases, energy efficient, lower carbon homes had already been delivered by these projects at the time of the empirical research. The quest for wider, more generalizable insights informed the choice of two case studies that differ so much in scale and building typology. Further information on the two projects is contained in Table 1 below and in the paper's bibliography.

3.2. Data collection

The data which underpins this paper was collected as part of a wider research project about the motivations, practices and experiences of stakeholders involved in self-build projects. The primary source of data comes from 14 semi-structured interviews with various practitioners involved with the case study projects (2 for Bath Street and 12 for Graven Hill) and 7 unstructured interviews with residents (2 for Bath Street and 5 for Graven Hill), all carried out by the lead author in 2019. This data is supplemented however with the outputs from a number of additional methods. In Graven Hill, the lead author spent a week studying the project 'on-site' moving between the offices of the Graven Hill Development Company in Bicester Town Centre, the homes of Self-Builders (both completed and ongoing), and the wider construction site of the project. An ethnographic field diary was used to capture insights into the ongoing delivery and experiences of the project. Meanwhile, given that the Bath Street project was completed and the homes inhabited prior to the undertaking of the research, interviews were instead supplemented with a focus group workshop held alongside key stakeholders from the Edinburgh housing sector (public, private and third) to explore the challenges and opportunities for replicating this sort of self-build project. Collectively, the methodological approach taken by the research is framed as two cases of 'multi-sited institutional ethnography' where, as articulated by Mikulewicz (2020), the emphasis on understanding shared meanings and practices from multi-sited ethnography is combined with a focus on the institutional(ised) dimensions of these practices.

4. Results

4.1. New market models: land use planning done differently

"It took a lot of time to put together, talking to lawyers, talking to solicitors, talking to lenders about what would be acceptable to them. And then one of the more time consuming elements was writing articles of association for the limited company which would be able to address everything we could foresee in terms of what could possible go wrong right up to what happens if one of us gets hit by a bus next week".

- Interview, Bath Street Architect

"Buying a plot of land for £27 m raised some eyebrows given that we are a council but then the arguments were that it hit the priorities of the council – it was delivering income, it was delivering housing need and innovation, and it was also providing economic development".

Table 1
Case study details. Sources: Graven Hill [22] *and John Kinsley Architects* [33].

	'Graven Hill'	'Bath Street'
Location	Bicester, Oxfordshire	Portobello, City of Edinburgh
Number of housing units (completed)	1900 (83 as of April 2019)	4(4)
Site	Suburban New Town	Inner-City Brownfield
Typology	Mixed	Tenement Apartments
Lead Developer	Gravel Hill Development Company	Homeowner Limited Company
Ownership Model	Mixed Tenure	Private Ownership
Financing (Land)	Cherwell District Council	Homeowner Limited Company
Financing (Build)	Individual Mortgages	Home-owner limited company
Status	Ongoing	Completed

- Interview, Cherwell District Council member

Time and Money, these are the key takeaways from the above quotes. Two things not in short supply for volume housebuilders who, as outlined in the first half of this paper, dominate the UK's new-build housing sector. It is perhaps no surprise, then, that these are two resources which need to be innovatively procured if an alternative mode of home delivery is to be possible. This is particularly so for the way in which they facilitate a relationship with arguably *the* key resource at the heart (and foundation) of the house-building industry: land. In addition to a complex land 'banking' system exploited by many large housebuilders, Payne et al. [9] identify the use of "options and conditional contracts" to acquire land, relying more on "networks and contacts than on markets" (p.6). Using the two case study projects, the purpose in this section is to demonstrate how attention to one of these resources can open up the ability to operationalise the other in transforming land from 'raw' material into final residential 'product', re-shaping the housing market in various ways.

Having purchased land from the Ministry of Defense, Cherwell District Council established the 'Graven Hill Development Company' (GHDC) with view to *"disrupting the traditional housing market"* (interview, council employee). Driven by the "*innovative aspirations"* of council leaders at the time, the establishment of the GHDC led to a number of the council's "*most talented"* civil servants in the fields of finance, planning and urban design, moving across to run this new corporate entity (interview, GHDC employee). With Cherwell District Council acting as the primary shareholder of the GHDC and "*not needing to make a developer profit of 20-25%"* (ibid.), the council are able to make two returns on investment. Firstly, they derive the profits from the company which return in the form of dividends. Secondly, because the money that is lent from Cherwell to the GHDC needs to meet state-aid requirements, it must be lent at a higher rate of interest than the council is able to borrow it from the national public works loan board. This uplift in interest rate serves as additional revenue for the council. As the GHDC employee who articulated the functioning of this model described: *"[t]his can amount to a good sum of money and as a result we have had a lot of interest from other councils in how to do this"* (emphasis from interviewee).

At Bath Street, the majority of what was a three-year process to construct the building was taken up by legal hurdles that needed to be overcome. In the first instance this required direct engagement with the landowner in order to ascertain willingness to sell. Subsequently, and in order to borrow money for the purchase of the land, it was necessary for the residents to come together and form a single legal entity (interview, Bath Street architect):

> *"The finance side of things would be the same if I was a developer just selling four flats, but the constitutional aspect of it in terms of how we set ourselves up as an organisation and making sure that it was acceptable to the lenders was the key issue".*

Despite perceptions that finance represents a key barrier to the upscaling of self build housing [12], the above quote argues that it is the legal rather than financial dimensions of the marketplace which occupied most of this project's attention. In both cases, what spawned was the establishment of new corporate entities, capable of embodying the innovation required to compete with dominant market players, if not directly in the form of market competition over specific parcels of land, then with the *perception* of what is normal for new housing in the UK. This latter point is perhaps most manifest through the rubric of planning permission and how *it* embodies the ethos of speculative housebuilding, so dominant in the context of the UK. For example one employee of the GHDC described in interview how despite "*people say[ing] that we have relaxed planning on the site"* they prefer to think of it as *"simplified and contemporary"* acknowledging that the GHDC has "*to act like any other developer"* and *"because people think that [we] are going to get preferential treatment [we] actually end up getting harder treatment!"*

Rather than simply marketing the site for a more traditional development model involving volume housebuilders, Cherwell council managed to procure funds from national government to explore a business case for taking it on themselves. As another employee put it in an interview: *"[a] district council delivering a development of this size would not have been possible without* support *from the government"*. The use of a 'Local Development Order' designed to streamline planning permissions for entire sites at land acquisition stage, paved the way for plot level permissions at a later date. Part of the mandate for this came from local consultations on new-build housing carried out as part of the business plan. These resulted in "*a lot of resistance and push back against cookie cutter homes and suggestions that they are terrible; all look the same and nobody talks to each other"* according to one employee. In the words of another, "*There was an emphasis on 'why can't the planers do something more contemporary'"* (interview, GHDC employee).

Echoing the sentiment of the architect's quote at the beginning of this section, one Bath Street resident believed that "joined-up thinking" was the key to making the project work (quote from interview). Another resident reflected more critically on the challenges in realising this thinking:

> *"There is a huge lack of understanding in government of what this model is. They just expect to be able to see exactly what everything will be like when it is finished … they are so used to a particular way of doing things"*

During the focus group workshop held with Edinburgh housing stakeholders, there was animated discussion over the value of establishing a register of planning approvals in the city which would allow the hard work put in by trail blazing projects such as Bath Street to be reproduced elsewhere. This would help overcome

the "*perception that planning works in certain ways and the only way to get permission quickly is to do what the big boys [volume housebuilders] do*". Meanwhile, the conversation continued, "*land gets snapped up and turned over quickly*".

The hard work done by intermediary actors in procuring physical space from within the confines of domineering land market regimes, presents the opportunity for what van Veelen (2020) describes as a more 'relational' and 'becoming' from of intermediation. It is within such spaces that alternative housing futures can be imagined. Through the creation of new entities, at both Bath Street and Graven Hill intervention into the housing procurement supply chain was shifted away from final product (home), and towards the core physical asset; land. This creates a conceptual space within which to enact difference in incubating potential innovation. Reflecting on the experience of the two case studies and contrasting this with the traditional housebuilding practices presented earlier by Payne et al. [9]; we would argue that planning permissions for new-build housing does not operate too slowly but, rather, too fast, compressing new home value chains and squeezing them dry of spaces within which to foster innovation. From the perspective of facilitating self-build housing, having opened up this space, it is possible to explore how value is *created* in a particular housing project, beyond the use v exchange binary discussed earlier [13].

4.2. New actor arrangements: The spatial and temporal affinities of homeowners

> "*Left to their own devices most people who build their own houses want to build sustainably. Sometimes they don't have the knowledge to do it and they need the guidance so they don't just stick a load of PV on the roof and think that does the trick. So there is education required but the desire is mostly there I think.*"

- Interview, Bath Street resident

> "*The council had also done a few projects on off-site manufacturing homes which has a close connection to a certain type of self build and is also an employment opportunity for the district as well. Bicester is a traditional commuter town so we wanted to bring other sorts of jobs*"

- Interview, Cherwell District Council Member

At Graven Hill a policy was put in place whereby plots for sale were offered to local Bicester residents before being opened up to a wider market. This was rationalised on capturing those who were already invested in the local area. Facilitated by the establishment of the GHDC, at arm's length from the council, steps such as this demonstrate the shift in a local authority's approach to governance from a *regulatory* one to a *proprietary* one [54]. Popularly known as the 'Preston Model' in the context of the United Kingdom to signify the efforts of that particular city, this approach is premised on local authorities prioritising local supply chains and businesses in council procurement strategies [55]. For Cherwell council, existing experience in small-scale custom build projects where owners had been able to input into local housing projects, gave them the ability to draw not only on local aspirations to build homes, but expertise and supply chain access too (interview, GHDC employee).

Meanwhile, in the case of Bath Street, the four resident families emerged from a series of meetings held at a local café, instigated by the lead architect's search for "*like-minded people … with an interest in Portobello and in the site*" (interview). This rationale proved effective, and one resident describes how this relationship between people and place continues to manifest itself:

> *"All of these extra incentives both during the build but also in the upkeep if it, that you don't get with other inner-city housing where people are parachuted in who haven't got investment in the place particularly or in the building".*

Involvement in the design allowed homeowners to plan for future material changes to the house, to accommodate anticipated future changes in personal and family conditions. As an example of such 'future proofing', one Bath Street resident decided to construct their home so that "*the boys can have their own space in the future*" (quote from interview). With two access doors built from the stairwell and the construction of a moveable wall, the apartment is divided into two distinct parts allowing for future changes to the make-up of their family to be accounted for in the design of the home(s). In a similar vein, one of the residents at Graven Hill reflected on the fact that he "*couldn't afford full PV now anyway, so it was about getting the core build insulation first*" (quote from interview). Because of the longevity afforded by his desire to invest in the design and construction of his family's own home, he was able to focus, quite literally, on the core fabric of the building and the construction of —as another resident described *their* approach— a "thermal envelope".

> "*You have got to look at it for whole life costs, the 20% odd you save compared to a developer you can put into the upfront coats of sustainable technologies*"

The above quote, from an employee of the GHDC, was in direct response to a question about the narrative of cost-saving from undertaking self-build projects vis-à-vis buying from a developer. Earlier we argued for the need to overcome a separation of a perceived lack in the demand for more customised housing options and a perceived lack in the demand for more energy efficient homes. Collapsing these, we can see here how it is only by allowing the two to interface that we open up the possibility for a more emergent and dynamic interpretation of 'demand'. Demand which includes temporal considerations and an implied desire not to have to move home when material domesticity preferences are shifting with income, family configuration, health etc.

> *"We haven't built a passive house. I'd never even try. Passive house is just a bureaucracy! Building to a passive standard is probably where we're at. But we are not going to go through all the bureaucracy of proving everything."*

This quote, from an interview with a resident at Graven Hill, demonstrates the problem of standardisation practices and the limiting factor they have, even when the target is more sustainable homes. Separating the demand for customization and the demand for more sustainable technologies is indicative of a system with an embedded problem of standardisation against which any dynamism is adjudged purely by the riskiness of its deviation from the 'norm'. As another resident who also constructed a low carbon home on the Graven Hill site believed:

> *"Because lenders don't want to lend against innovative zero-carbon construction methods, building control don't know what it is, and insurers are reluctant to insure; self-build is needed just to give the wider market the kick up the backside it needs."*

The above points speak to the need to bring the relationship between builders and owners that is unlocked by self-build into dialogue with the wider housing system and with the markets that operate within and through it. In contrast to supposedly 'niche'

projects discussed in the first half of the paper [10,15], these case studies not only demonstrate what is possible in terms of doing housing delivery differently, but what is possible *as a result of this* in terms of the relationship between people and their homes, while remaining within the bounds of certain home-ownership traditions. Or, as one Bath Street resident described it, while still *"arriving at a conventional home ownership model at the end"*.

While at Bath Street an approach was required that arrived at a 'conventional' model of home-ownership but with a much enhanced product in terms of quality, at Graven Hill both the size and longevity of the project means that there is a need to actively resist the risk of homogenisation and, in doing so, maintain the benefits derived from self-build (interview, GHDC employee):

> *"We have had groups come who want to build together and they are building together but they had to buy the plots separately in order for us to be able to justify not selling a group of plots to a particular developer to then do their own builds on"*.

Not only capturing the desire of the Gravel Hill project to avoid the 'cookie-cutter' housing problem discussed in the previous section, this quote also demonstrates how, to achieve this, the project needed to use innovative methods to deliberately (but not explicitly) exclude volume housebuilders from the site.

4.3. New institutional settings: the re-institutionalisation of trust and leadership

> *"If I was doing this as a developer I would be incentivised to deliver it to the lowest possible standard that is still compliant with regulations in order to maximise my profit. But for this my incentive was to build to the highest possible spec I can afford"*
>
> - Interview, Bath Street Architect
>
> *"He is local to the area anyway and has a lot of knowledge in sustainable buildings and is a lawyer. He is helping us to design the school so that we can make the most of the space in the gym hall and also use it as a community hub"*.
>
> - Interview, GHDC Employee

Located between, and inspired by, traditional Scottish tenements, the Bath Street apartment building is born out of the group of residents' own commitment to developing a shared sense of place. The building was delivered through a 'shell and core' approach whereby the individual owners fit out their own flats but the building itself was constructed as a singular unit (JKA 2019). In addition to reducing costs, this also allowed issues of energy efficiency to be embraced collectively, and the apartments do not require central heating. By getting initial buy-in for the construction methods from all the residents, both the efficiency and affordability of these technologies increased substantially through their integration into the build process.

> "*When we were building this I was like most people in Scotland thinking it was not possible to not have heating but he [the lead architect] showed us it was possible. I don't understand why the planners are not saying this is the way forward, for all houses!"*

Expanding on this quote, a resident described in interview how the project "*worked so well because everybody trusted [the lead architect] and he had the knowledge to be able to build this*". As the architect himself remarked: *"They put a lot of trust in me of course and I was the one who steered the process from the beginning"*. Discussing future prospects for reproducing the model, he hopes that the track record of delivering the Bath Street project and the fact they are *"not-prototyping"* will go some way to offsetting the fact he won't be involved as both architect *and* resident.

At Graven Hill, the project's size means that it embraces a wide variety of construction methods and ultimately delivers an extremely diverse set of housing types. However we want to focus here not on the construction of a specific home, but on the ongoing nature of the project's emergence and what Benson [31]describes as 'Affective spaces'; spaces within which unforeseen connections, relationships, and possibilities are allowed to spawn. The following is a field diary entry for Friday May 17, 2019[2]:

"Oh George, yeah he is always borrowing that. He's got my drill set as well actually, didn't volunteer that one back did he!" These were the first words uttered to me as I was welcomed into the home of a recently completed self-builder. Jokingly, he referred to my handing him a helmet, given to me to wear as I wandered around the development site by another self-builder with whom I had spent a few hours earlier in the week. Having lived in and around new-build housing estates in the past, I wonder whether this sort of the relationship is possible to forge <u>without</u> actually constructing one's homes and lives alongside each other, in a literal as well as metaphorical sense. One of the reasons people often give for not talking to neighbours is that they don't have a lot in common. That can obviously never be said to be true here …

Initially reluctant to sell plots to custom-build house builders and focusing on individual self-builders, the GHDC has since started to explore the potential of working alongside smaller builders for whom owner-input is already a core part of their business model. As one employee described it, the latest revision of the master plan "*recognizes that not everybody wants to self-build but they do want to personalize so we are moving in this direction I think*". A benefit of this more adaptive and dynamic approach to how self-build comes to be defined was identified by the interviewee as the ability to "*work with companies who are already embracing the sustainability narrative*" and who have "*captured a market for turnkey providers where the homeowner designs the house and comes back and its built to that spec*". Considerable emphasis was placed by a number of interviewees on the ability of this model to further enhance local growth strategies through the privileging of local providers.

One of the first residents to begin construction of their home at Graven Hill was the individual referenced in the quote at the outset of the section. This resident -a self-proclaimed "*eco-enthusiast but by no-means a tree-hugger*"- described how, having constructed his home to energy efficient standards using a variety of niche technologies, has subsequently set about helping fellow residents as well as the GHDC, to take on a similar mandate in their construction methods. As a result, a narrative of sustainability, acknowledged as important but not necessarily at the forefront of the local authority's self-build message, continues to undergo a technological diffusion, facilitated by the emerging, and iterative nature of the project's build-out. Capturing the essence of the field diary vignette presented above, a member of Cherwell District Council described Graven Hill as follows during an interview:

> "*This is a social experiment in so many ways. And forget where it is because a lot of people don't want to live in Bicester for whatever reason anyway, but we can create a whole new sense of place because of the size of the project. So if people want to bring their extended families here and all build their own homes, they can*".

Back in Edinburgh, the lead architect for Bath Street remains

[2] The names in this vignette have been changed.

enthusiastic about reproducing the model:

> *"All of the sites we are looking at to reproduce this are privately owned and the reason they have come to us is because they are all owned by people who essentially kind of live next door and therefore don't want to sell their site to a private developer who is going to pile any old rubbish on there."*

This notion of the *"benevolent"* landowner as the architect described it, was echoed during an interview with one of the 'custom-build' contractors working with the GHDC. Demonstrating the value of a more intimate relationship between land, homes, and their occupiers, in lieu of an institutional framework actively premised on supporting the diffusion of quality house-building practices, the scale of the local and the affectual, can be seen to foster a desire for something innovatively different. Not just by those directly involved with projects, but by a broader network of situated, interwoven actors, committed to shifting the way in which people gain access to good quality, more sustainable, homes.

5. Discussion

Although the term 'self-build' and its precise definition have been open to debate, the two very different examples presented here have strong commonality in demonstrating that self-build housing projects open the door for social innovations that deliver better quality homes, more energy efficiency and a greater sense of community for the new residents. Together, Bath Street and Graven Hill embody the holistic re-alignment not only of housebuilding supply and procurement chains, but of home-making *value-chains*. Our analysis reveals value chains that ultimately allow homeowners to envisage their future in a particular home and in a particular location and which opens up the possibility for a better understanding of the demand and aspiration of homeowners to therefore embrace (and invest in) sustainable building design and construction methods.

Our two cases also illustrate just how challenging it is to diverge from the 'norms' of UK house-building culture and practice. Indeed, it is through revealing the similarities in what it takes to achieve this between otherwise contrasting types of housing development, that the value of the social innovation framework drawn upon here is most evident. Hoppe and de Vries' [53] notion that 'new market models', 'new actors configurations' and 'new institutional settings' are able to 'create room' for social innovation has been shown here to manifest in the form of *spaces*, both physical and conceptual, within new home supply chains that differ substantially from the business as usual approach of speculative housebuilders. While this social innovation framework has been an effective tool for transcending these two case studies and identifying what they have in common vis-à-vis the failing of the existing housing system in the UK, we must also caution regarding the inseparability of markets, actors, and institutions in a given setting, and the unique set of circumstances from which the opportunity for innovation emerges. For example, while in Graven Hill the local authority was instrumental in driving forward the project and "doing things differently", subsequently allowing pioneering citizen innovators to follow, at Bath Street this relationship was reversed, with the project's exemplary status only recognised upon completion.

However it manifests, there is no escaping the importance of the local scale of governance to mainstreaming the socially innovative qualities of self-build housing. Both replicating a small scale delivery model like Bath Street in new locations across a city or continually nourishing a large scale project such as Graven Hill, will require not just a vision about the positive values of self-build but also an active resistance to the dominant speculative model of housing provision in the United Kingdom. Given the absence of a zero carbon homes policy at the national level and with limited devolution of powers, UK local authorities are unable to command the building of low carbon homes. They are well placed, however, to fulfill a key and ongoing mediation role between the actors and spaces of (potential) innovation. The local actors involved in the two projects examined here had to be socially innovative and entrepreneurial to succeed within the dominant cultural, social and political context of housebuilding in the UK. It could therefore be argued that replication and mainstreaming (more speed, more scale, less dependent on local innovators) will require considerable enablement on the part of a national government not only willing to pursue ambitious sustainability targets, but willing to devolve the decision making required for these to be realised on the ground. The well-studied history of the UK's broken housing market, the enlightened examples from European neighbours and early evidence of new self-build in the UK (presented in this paper), together suggest that it is only by allowing local governments and municipalities to accurately represent and actively endorse the aspirations and desires of their citizens, that systemic change towards greater sustainability could emerge within the UK's housing system.

6. Conclusion

Introducing long-term national government regulations to try and encourage an overtly politicised housing sector operating in the speculative realm to evolve and transition towards energy efficient homes has proven challenging. Here however we have shown what is possible when pursuing less formulaic and more bottom-up approaches to the delivery of low(er) carbon homes. Framed as a socially innovative means of opening up the demand for technological progress, local interventions into market practices, operating in the shadow of the ZCH policy failure, have actively cultivated this relationship in a more intimate way, connecting the benefits to be derived from energy efficient housing to the people who are able to enjoy them. Recognising this allows us to envisage how self-build can be positioned as a route into mainstreaming and upscaling the delivery of more sustainable housing outcomes. In presenting our findings, the paper has made three contributions to understandings of self-build housing as a socially innovative practice capable of facilitating a transition to more energy efficient homes. Manifest through the application of Hoppe and de Vries' [53] framework, we characterise these as the i) physical, ii) conceptual, and iii) affective spaces of innovation. These are articulated in turn below.

Firstly, we have demonstrated the importance of fostering innovation at the origins of housing supply chains, namely the acquisition of local land as a physical space for facilitating innovation and the possibility of alternative housing futures. In contrast to popular narratives, the delivery of a more democratic and transparent housing system is not inhibited by a planning system that is too slow, but by one that is too quick to appease embedded practice. Secondly, attention has been drawn to the importance of conceptual space for a variety of housing delivery actors to re-orientate their relationship with homes and their occupiers. This might be in the form of local authorities carefully balancing their proprietary and regulatory activities, or an architect-developer operating to combine the desired outputs of the existing system (individual ownership models) with the benefits of doing procurement differently (better quality homes). Thirdly, the value of affective spaces captures the need to avoid prescriptive approaches to what constitutes a 'zero carbon' home, instead allowing for a more serendipitous diffusion of energy efficient and sustainable habitation practices to emerge. Combining the platform for change

offered by physical space and the imagined alternatives allowed to spawn within the resulting conceptual and affective spaces, it is possible to foster an ongoing and emergent dynamism in home delivery, attentive to the shifting understandings and aspirations of different homeowners.

In reflecting back on the arguments presented, it is important to remain grounded in what has been illustrated by the selected case studies. In Edinburgh considerable challenges remain in trying to reproduce the model delivered at Bath Street and conversations are ongoing regarding how to do this without the intimate involvement of the original architect. Likewise, while we can frame the evolving nature of the Graven Hill project in a positive way and account for this as inevitable given the magnitude of the project's vision, both the power of traditional housebuilding markets, and the institutional capacity needed to keep more innovative heads above water, should not be under-stated. However, it is important to reiterate that it was never the intention of this paper to suggest that Graven Hill and Bath Street represent reproduceable exemplars in and of themselves, but to focus on identifying the socially innovative practices that made them possible. Future research needs to engage more thoroughly with the assertation that self-build fosters the delivery of more sustainable (beyond just energy efficiency) homes, both across broader geographical scales, and also in how the social and economic (as well as environmental) dimensions of sustainability are constructed *through* this relationship. In lieu of such research, the findings presented here illustrate what becomes possible when we empower local actors to open up the spaces for housing system innovation.

CRediT authorship contribution statement

Matt Lane: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing - original draft. **Dan van der Horst:** Funding acquisition, Investigation, Project administration, Resources, Writing - review & editing. **Margaret Tingey:** Writing - review & editing. **Connor Smith:** Writing - original draft. **Janette Webb:** Writing - review & editing.

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